TOYOTA

TOYOTA MOTOR NORTH AMERICA, INC.

WASHINGTON OFFICE
325 7th Street, NW - SUITE 1000, WASHINGTON, DC 20004

TEL: (202) 775-1700
FAX: (202) 822-0928

VIA ELECTRONIC DELIVERY

August 15, 2019

Marlene H. Dortch, Secretary
Federal Communications Commission
445 12th Street SW
Room TWA325
Washington, DC 20554

Re: *Ex Parte*

ET Docket No. 13-49, *Revision of Part 15 of the Commission's Rules to Permit Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band*

GN Docket No. 18-357, *Petition for Waiver to Allow Deployment of Intelligent Transportation System Cellular Vehicle to Everything (C-V2X) Technology*

Dear Ms. Dortch:

This is to inform you that on Tuesday, August 13, 2019, Hilary Cain and John Kenney of Toyota (collectively, the "Toyota Representatives") met with Howard Griboff, Aspasia Paroutsas, and Jamison Prime of the Office of Engineering and Technology ("OET") and Aleks Yankelevich of the Office of Economics and Analytics ("OEA").

The Toyota Representatives reiterated the importance of all three phases of testing being completed before any decisions are made to allow operation of unlicensed devices in the 5.9 GHz band. The Toyota Representatives noted that the "re-channelization" devices submitted to the Commission for Phase I testing were not fully capable in that they did not use 160 MHz channels consistent with the anticipated use cases for unlicensed devices in the band. The characteristics of 160 MHz devices are different than those of 20 MHz devices and, as a result, have a greater likelihood of causing harmful interference to Dedicated Short Range Communications ("DSRC") in the upper channels. In addition, Toyota Representatives noted that the Phase I test results indicated that if high power U-NII-4 Wi-Fi devices were permitted to operate outdoors under the "re-channelization" approach, there would be a permanent interference zone around those devices of 250 meters or more. Toyota Representatives noted that this level of cross-channel interference to DSRC operations is clearly unacceptable and may very well disqualify the "re-channelization" approach from further consideration.

The Toyota Representatives also acknowledged that the desire by some stakeholders to gain access to the band for cellular vehicle-to-everything ("C-V2X") has created additional challenges for interference testing. Toyota Representatives noted that the existing sharing proposals are DSRC-specific and are not applicable to potential sharing with C-V2X.

The Toyota Representatives restated their support for DSRC and stressed the importance of maintaining all seven channels in the 5.9 GHz band for DSRC operations. Toyota Representatives repeated their belief that the "detect-and-vacate" proposal offers promise as a viable path forward on sharing between DSRC and unlicensed operations in the 5.9 GHz band. The Toyota Representatives reiterated the potential safety-of-life use cases, including applications to protect pedestrians and other vulnerable road users and to support automated driving, that would necessarily be lost if the Commission were to reduce the number of channels that are available to DSRC.

The Toyota Representatives expressed continued concerns over any decision by the Commission to fragment the 5.9 GHz band into non-interoperable vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communication technologies. Interoperability is essential to fully realizing the safety benefits of this cooperative safety technology, in which devices communicate directly with each other. Toyota Representatives also noted the importance of backward compatibility based on same-channel coexistence in ensuring that technology deployed in the future will be able to communicate with technology that is already in the market today. Toyota Representatives reminded OET and OEA that none of the C-V2X versions are interoperable with DSRC, and that 5G NR V2X (one version of C-V2X) will not be backward compatible with LTE V2X (another version of C-V2X). Toyota Representatives also reiterated that NGV V2X, which is currently under development at IEEE (i.e., 802.11bd), will be both interoperable and backward compatible with DSRC and therefore offers a non-disruptive evolution path.

The Toyota Representatives also discussed the importance of preserving spectral efficiency in the 5.9 GHz band with respect to V2V and V2I technology. Toyota Representatives asserted that it is simply not spectrally efficient to duplicate services on two or more channels. For example, it makes little sense to transmit Basic Safety Messages on one channel using DSRC, on another channel using LTE V2X, and on yet another channel using 5G NR V2X. However, because LTE V2X and 5G NR V2X are not capable of co-channel existence with each other or with DSRC, this duplication will be required if all three technologies are permitted to operate in the band and automakers and other stakeholders are permitted to choose their preferred protocol. Moreover, if additional technologies are developed in the future that are incapable of co-channel existence with DSRC, LTE V2X, or 5G NR V2X and these additional technologies are permitted to operate in the band, even more fragmentation and duplication will occur. Toyota Representatives also noted that, because of persistent packet loss and attendant duplicate packet transmission, LTE V2X is less spectrally efficient than DSRC – requiring more than 10 MHz of spectrum to support the same number of vehicles that DSRC supports in 10 MHz.

The Toyota Representatives asserted that, if the Commission was interested in optimizing the societal value of the 5.9 GHz spectrum, it would permit only DSRC and technologies that are backward compatible and interoperable with DSRC in the 5.9 GHz band. However, Toyota Representatives floated the idea of allowing C-V2X to operate in the upper two channels of the 5.9 GHz band on a detect-and-vacate basis with incumbent DSRC. Under this approach, C-V2X would temporarily vacate a channel when DSRC transmissions are detected. Although a loss of

interoperability increases equipment costs and reduces societal benefits, this approach would ensure that DSRC deployments in the upper part of the band are protected from interference and that existing and planned DSRC investments are not undermined by fragmentation. Over time, if C-V2X proves to be a viable technology and overtakes DSRC as the preferred V2V and V2I communication technology for automakers and other stakeholders in the United States, the result would be essentially unencumbered access to these top two channels for C-V2X.

/s/Hilary M. Cain
Hilary M. Cain
TOYOTA
Director, Technology and Innovation Policy
325 7th Street NW, Suite 1000
Washington, DC 20004